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Some remarks on *Hipposideros speoris* and *Hipposideros larvatus* (Chiroptera, Rhinolophoidea)

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INTRODUCTION, SUMMARY AND ACKNOWLEDGMENTS

Three hitherto unpublished specimens of *Hipposideros larvatus* (HORSFIELD, 1824) from the Island of Nias (off Sumatra's West Coast), and one specimen of the same species from the Island of Sumba (ESE of Java) led us to a critical study of the subgeneric "*speoris*-group" of this genus of horseshoe bats. The taxonomical history of the genus *Hipposideros* GRAY, 1831 is resumed (§ 1). The original picture of *H. speoris* (SCHNEIDER, 1800), under the name *Vespertilio speoris* was easily found in several libraries. The accompanying text, however, proved to be extremely rare. Thanks to the kind help of Dr VAN DEURSEN of the American Museum of Natural History, New York, we can give here the original text (§ 2) of which the date is discussed. The type locality of this species is the Oriental region (§ 5). The occurrence of this species is generally recorded from India and Pakistan, and from Ceylon. Some measurements of specimens from Ceylon are given in table 3. Its occurrence in Timor and in Amboina, from where it was recorded in 1813 and 1835, seems rather dubious.

We interpret *Rhinolophus crumeniferus* PÉRON, 1807, from Timor, sometimes considered to be a synonym of *Hipposideros speoris*, as *Hipposideros* cf. *cervinus* (GOULD, 1854) (§ 3).

Rhinolophus marsupialis DESMAREST, 1820, originally a manuscript name of GEOFFROY SAINT-HILAIRE, is a synonym of *Hipposideros speoris* (§ 4).

Hipposideros larvatus (HORSFIELD, 1824), type locality Java, has been recorded, moreover, from Bali, Sumba, Borneo, Sumatra, Hainan, Siam, Burma (§ 6). It differs from *H. speoris* by a greater length of the forearm (§ 11) and in some minor details (§ 9 and 10). We could not find any difference between the two species in the development of the glandula frontalis (§ 8).

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The accent added to some of the scientific names in this summary is an indication for the right pronunciation.

We are very indebted to the directors and curators of the Rijksmuseum van Natuurlijke Historie, Leiden, Naturhistorisches Museum, Basel, and Muséum d'Histoire Naturelle, Genève, and to Mr H. J. V. SODY, Amsterdam for their kind help and permission to study specimens.

§ 1. GENUS *Hipposideros* GRAY, 1831

The first horseshoe bat named in the binomial system is the European greater horseshoe bat, *Vespertilio ferrum-equinum* SCHREBER, 1774 (p. 174, pl. 62). LACÉPÈDE (1799, p. 15) made it the type species of a new genus *Rhinolophus*. Already a year earlier CUVIER (1798, p. 105) had used the vernacular French name "rhinolophe" in about the same sense. Outside France this generic name was not immediately in use. The European lesser horseshoe bat was named *Vespertilio hipposideros* BECHSTEIN, 1800 (vol. 2, p. 629, cited after MILLER, 1912, p. 149; SHERBORN, 1902, p. 460, cites *Noctilio hipposideros* BECHSTEIN, 1800, p. 736. We have not seen BECHSTEIN's book).

An Oriental species of horseshoe bat was published in 1800 or earlier by SCHNEIDER under the name *Vespertilio speoris* (see § 2). Soon afterwards, however, the generic name *Rhinolophus* was generally in use, and this genus was held to contain all known European and non-European species of horseshoe bats.

GRAY (1831, p. 37) separated a few tropical, old world species of horseshoe bats from this genus, and united them in a new genus *Hipposideros*.

PETERS (1872, p. 312), DOBSON (1872 and later), and some other authors have used *Phyllorhina* BONAPARTE in about the same sense as *Hipposideros* GRAY. According to DOBSON (1876, p. 58, and 1878, p. 127) *Phyllorhina* BONAPARTE dated from 1831, and *Hipposideros* GRAY from 1834, DOBSON's preference for *Phyllorhina* was, therefore, quite understandable as a matter of priority.

BLANFORD (1887, p. 637) and PALMER (1904, p. 535) (cf. also SHERBORN), however, have made serious objections against the generic name *Phyllo(r)rhina*. *Phyllorhina* has been used for the first time by LEACH (1816, p. 5) as a subgenus of *Rhinolophus*, containing only the lesser horseshoe bat from England, whereas the greater horseshoe bat remained in the nominate subgenus *Rhinolophus* (*Rhinolophus*). Not a single later author has ever arranged these two species under different subgenera, or genera. *Phyllorhina* LEACH, 1816, therefore, is to be considered as a junior synonym of *Rhinolophus* and not available since 1816.

Phyllorhina BONAPARTE, 1831 (p. 16) is a nomen nudum.

BONAPARTE (1837, fasc. XXI) intentionally revived the "graceful" name introduced earlier by LEACH, this time, however in the spelling *Phyllorrhina*, for a group of Oriental species, until then belonging to the genus *Rhinolophus*. The doubling of the r is, according to the Paris recommendation with regard to Art. 35 of the Rules, insufficient to revive an unavailable generic name (Bull. Zool. Nomenclature 4, p. 162; MAYR c.s., 1953, p. 227).

With regard to *Hipposideros*, DOBSON refers to GRAY (1834, p. 53). Here GRAY mentioned this generic name without diagnosis and without any species being quoted as belonging to this genus. This publication, therefore, could give no validity to *Hipposideros*. But GRAY had, in fact, already earlier (1831, p. 37), proposed *Hipposideros* as a generic name, in such terms as to be valid under the Rules.

There are ample reasons, therefore, to reject both *Phyllorhina* and *Phyllorrhina*, and to use *Hipposideros* GRAY (1831).

SCLATER (1901, p. 116) has designated *Hipposideros speoris* (SCHNEIDER) as the type species.

DOBSON (1876, p. 58, and 1878, p. 127) has given a diagnosis of this genus (under the name *Phyllorhina*) paying much attention to the soft parts, particularly to the horseshoe apparatus. The functional importance of this complex organ has been assumed by GEOFFROY (1813) and TEMMINCK (1835), and has been proved experimentally in the genus *Rhinolophus* by MÖHRES (1953).

MILLER (1907) has based his diagnosis of the genus *Hipposideros* almost wholly on the characters of the dentition and of other parts of the skull. He has based on this genus, uniting it with a few other genera, the family of *Hipposideridae*, until then included in the *Rhinolophidae*. The facial appendages are not considered in MILLER's book.

The importance of both soft parts and the skull for taxonomical research makes it desirable to apply a technique of conservation that makes it possible to examine them both. The soft facial parts of specimens preserved in alcohol are, as a rule, in good condition for the observation of details. When the head of such a preserved specimen is carefully skinned, it is possible to study both the skull and the soft parts. The only drawback to specimens prepared in alcohol is that the colours of the pelage are not quite reliably preserved. In dried and prepared skins, kept in dark, the colours are better preserved. In such dry specimens, however, the finer details of the nose leaf have suffered too much damage to allow exact description.

§ 2. *Hipposideros speoris* (SCHNEIDER, 1800)

Some copies of J. C. D. SCHREBER, *Die Säugthiere in Abbildungen nach der Natur mit Beschreibungen* (Erlangen, 1774—1846, Supplement 1840—1844) contain a coloured engraving numbered Suppl. LIX B, with the caption "*Vespertilio speoris* SCHNEID., BOCK sc." It shows a male horseshoe bat with extended wings, and, moreover, two figures of bat's heads, numbered 1 (coloured) and 2 (plain), both slightly enlarged in comparison with the figure of the whole animal. The front shows an unpaired dark transverse groove surrounded by a lighter coloured rim. The front edge of the horseshoe shows no incision. Lateral to the horseshoe there are three additional lateral folds. The tail is, for its greater part, included in the uropatagium, its end, however, protrudes freely for 3 mm (about $\frac{1}{6}$ or $\frac{1}{7}$ of the whole length of the tail).

This plate is undated. As SHERBORN (1891, p. 590) has pointed out, the *Göttingische Anzeiger von gelehrten Sachen*, 101/102 Stück, den 26 Junius 1800, p. 1015—1016 has announced: „Von den Schreberischen Abbildungen von Säugethieren haben wir nun auch das 56, 57, 58 und 59 Heft vor uns, in welchem..... pl. LIX B Suppl. SCHNEIDER's *Vespertilio*

speoris nach dessen eigener Zeichnung."

In the text of SCHREBER's work this plate is mentioned only much later: Supplement I p. 420 (1840) and Supplement V p. 658 (1844).

The engraving is the earliest known publication of the specific name *speoris*, and is, in our opinion, to be considered as valid under the Rules of Nomenclature. In the engraving the characters of the species are clearly indicated.

TEMMINCK (1835, p. 17) has referred to this plate as LIX C, and PETERS (1872, p. 320) as LIX A. We have not found any reason for these different designations.

Much rarer than this plate is an undated pamphlet containing two leaves with the signature X and X 2, or four unnumbered pages in quarto. Because of its rarity we insert here a full reprint of this text.

Beschreibung und Abbildung einer neuen Fledermaus aus Ostindien. Beyde Exemplare, welche ich in Weingeist aufbewahrt zur Untersuchung erhielt, waren männlichen Geschlechts mit herabhängendem Gliede, und ein wenig in der Grösse verschieden. Die ganze Gestalt ist wenig von der Gestalt unserer gemeinen unterschieden; der Schwanz in der Haut ganz eingeschlossen, und die Flügelhaut selbst ganz kahl; unter dem Elbogen und Arme ist sie in kleine viereckige Gitter deutlich abgetheilt. Die Ohren, grösstenteils kahl, haben auf der innern Fläche auf der Seite nach aussen feine Falten in die Quere, und am untern Buge einen kleinen kegelförmigen Anhang. Die allgemeine Farbe ist graubräunlich, ohne Flecke. Die Bildung des Gesichts ist höchst sonderbar, und unterscheidet diese Art von allen übrigen. Die zwey merkwürdigsten Stücke dieser Bildung sind die Stirnhöle und die weite äussere Nasenhöle mit Falten umgeben. Die Falten erinnern an die ähnliche Bildung beim gemeinen Igel und *Sorex cristatus*, wie Lafaille ihn abgebildet hat. Unter den Fledermäusen finden sich aber auch einige Arten, welche einzelne Spuren derselben Bildung zeigen. Die Spitzmaus-ähnliche Fledermaus des Hrn. Pallas hat vor und unter den Augen eine nackte kleine Höhle (fossula) oder einen häutigen Sack oder Falte (sinus) von ziemlicher Grösse (insignis) ohne Ausgang, dessen Gebrauch auch Hr. Pallas nicht errathen konnte. Daubentons Bartfledermaus hat ebenfalls eine breite kahle und schiefe Furche an der Stirne, scheint auch eine ähnliche Nasenhöle zu haben; aber die Beschreibung von beyden bleibt mir noch etwas dunkel, weil ich Daubentons Originalzeichnung in dem Augenblicke nicht vergleichen kann.

Die Nase besteht bey der neuen Art aus einer grossen fast viereckigten Höle ohne alle Haare, in deren Grunde zu unterst nach den Lippen zu die beyden Nasenlöcher sichtbar sind. Neben diesen Löchern steht auf jeder Seite ein Blättchen in die Höhe, und unten am Ende nahe an den Lippen steht ein kleiner häutiger Kegel nach oben zwischen den beyden Nasenlöchern mit der ganzen Länge frey und nicht angeheftet, wir eine Scheidewand gekehrt. Von beyden Seiten ist diese grosse Nasenhöle mit vier merklichen Falten umgeben, wovon die innerste und grösste die ganze Höle von unten und an den Seiten umgiebt; die drey übrigen stehen mehr an den Seiten, und werden eine nach der andern immer kürzer. Sie sind übrigens so kraus gebogen, wie an der Nase des Igels. Ueber dieser Höle, in der Mitte zwischen ihr und der blinden Stirnhöle, geht ein häutiger Kamm in die Quere, welcher auf der untern Fläche am Grunde durch drey häutige Fäden gehalten wird, damit er sich nicht zu sehr nach oben überschlagen könne. Gewöhnlich steht dieser Kamm mit dem Rande nach der Nasenhöle zu übergebogen. Zur Seite, aber etwas niedriger, als der Kamm, liegen die beyden kleinen Augen. Die Stirnhöle sitzt in der Mitte der Stirn; weit über den Augen; die Oefnung ist gross und rings herum mit Haaren umgeben; ihre Gestalt lässt sich sehr verändern, wenn man mit der Sonde hineinstösst; dadurch fühlt man zwar, dass die Höle tief unter der Haut weggeht, aber man verspürt nirgend einen Ausgang; auch nicht, wenn man die Haut der Höle als einen Beutel umkehrt. Ausser den zwey starken Hundszähnen in jeder Kinnlade, konnte ich noch unten die vier Schneidezähne erkennen, welche oben viel breiter sind als unten, und eine eingekerbte, meist dreyzackigte Schneide haben. Zwischen den beyden obern Hundszähnen sitzen nur zwey kleine und schwache Zähne im Zahnfleische, welche mit demselben sich bewegen lassen. Im Gaumen zählte ich sieben Furchen, welche nicht alle ganz, sondern die meisten unterbrochen waren. Oben zählte ich auf jeder Seite vier grosse vielzackigte Backenzähne, von

welchen die Hundszähne nur durch die Länge und die einfache Spitze unterschieden sind. Im untern Kinnbacken folgen hinter den Hundszähnen in unterbrochener Reihe fünf Backenzähne, woran die beyden nicht so viel Spitzen als die andern haben, und mehr den Hundszähnen gleichen.

Der wunderbare Bau der Nase, nemlich die grosse und tiefe Höle, in deren vertiefung die Nasenlöcher liegen, die vier krausen Falten, womit die Höle umgeben wird, und drittens der häutige Kamm in die Quere über die Nasenhöle, scheint ganz und allein zur Verstärkung des Geruchs, und zur Erweiterung des Berührungspunkts, auf welchen die aufstossenden Geruchtheilgen treffen sollen, zu dienen. Die neuerlich angestellten Versuche mit dem Gesichte der Fledermäuse, aus welchen man einen ganz eigenen Sinn dieser Gattung hat folgern wollen, scheinen ebenfalls auf die Stärke des Geruchs bey diesen Thieren hinzudeuten. Einige davon mögen auch wohl ein empfindlicheres Gehör haben, weil sie grössere und künstlich zusammen gesetzte äussere Receptanten des Schalls haben.

Im Deutschen würde ich diese Art Tiefnase, lateinisch *speoris*, d.i. die Nase in einer Höle, nennen.

Frankfurt an der Oder,

SCHNEIDER.

The specific name in SCHNEIDER's pamphlet is clearly derived from the Greek words *σπεος*, cave, and *ῥις*, nose. It should, therefore, be pronounced with the accent on e.

The text has the same size and form as SCHREBER's book, and no other "Abbildung" is known to which the text could refer, than only SCHREBER's plate LIX B. It is, however, not quite certain that text and plate were published at the same time.

The author is JOHANN GOTTLÖB SCHNEIDER, born January 18, 1750. He was professor of classic philology at the University of Frankfurt an der Oder, from 1776 until 1811. In this year the whole University was removed to Breslau where SCHNEIDER occupied the chair of classic philology until 1816, when he was appointed librarian. He published several books and papers on zoological subjects. He died in Breslau, January 13, 1822 (biography in *Dictionnaire des sciences naturelles*, vol. 61, p. 218).

That plate and pamphlet belong together is confirmed by ETIENNE GEOFFROY SAINT-HILAIRE (1813, p. 261) in the following passage.

Le Rhinolophe cruménifère. *Rhinolophus speoris*. Le nom de *speoris* fut donné à cette espèce par Schneider à qui on en doit la première mention, et celui de cruménifère, par MM. Péron et Lesueur qui en ont donné une autre figure dans l'Atlas du Voyage aux Terres Australes. Cette chauve-souris est une des dernières publiées et est toutefois des mieux connues: la détermination que nous en présentâmes dans nos cours publics, en égard à nos subdivisions, engagea mon célèbre ami M. Péron à la donner sous son vrai nom générique; ce que nous reproduisons aujourd'hui. Schneider inséra son travail sur cette espèce dans l'ouvrage de Schréber; c'est une sorte de mémoire sans pagination donné sous forme de Supplément: Schréber ne l'a rattaché à son livre qu'en donnant à la figure qui l'accompagne un numéro relatif à celui des autres chauve-souris. Le numéro de cette planche est 59 B.

We understand this passage as follows. GEOFFROY recognized this species as a horseshoe bat, and referred to it in his lectures. This has induced PÉRON to publish it as a species of *Rhinolophus*. Geoffroy agreed with this generic name.

The name "cruménifère" will be discussed in § 3.

GEOFFROY's description (1813, p. 261—262) of his specimens from Timor, and the drawing of the head on his plate 5 confirm that he really refers to the same species as SCHNEIDER did.

Reading the evidence of GEOFFROY we cannot understand why SHERBORN (1930, *Index Animalium*, p. 6056, i.v. *speoris*) dated SCHNEIDER's

text circa 1817, in contrast with the plate LIX B of 1800. In this respect we agree rather with F. POCHE (1911, p. 147 and 180), who concluded that SCHNEIDER's text was published before 1807, most probably in SCHREBER part 56, 57 (1797/8), or at least in one of the next preceding, or next following parts of SCHREBER.

In the copy of SCHREBER, *Die Säugthiere*, in the possession of the American Museum of Natural History, New York, SCHNEIDER's text has been inserted in vol. 4 (1792) opposite to pages 962, 963, 966, and 967. We are indebted to Dr VAN DEURSEN of this Museum for a photocopy of text and plate.

In the Library of the British Museum (Natural History), London, the same text has been inserted at the end of volume 5 (1810) (Catalogue, vol. 8, Suppl. P — Z, i. v. Schneider, J. G.).

The text is lacking in the copies of Schreber in the following libraries: Teyler's Library, Haarlem; University Library, Amsterdam; Rijksmuseum van Natuurlijke Historie, Leiden; Naturhistorisches Museum and University Library, Basel (kind information of Dr L. FORCART); Muséum d'Histoire Naturelle, Genève; Senckenberg Museum, Frankfurt am Main.

The type locality of the species will be discussed in § 5.

We have already pointed out in § 1, that since 1831 the species is arranged under the genus *Hipposideros*.

§ 3. *Rhinolophus crumeniferus* PÉRON, 1807

The finest picture of bats we have ever seen is the coloured plate 35 in the atlas accompanying the narrative of PÉRON and LESUEUR's voyage to Australia in 1800—1804 (PÉRON, 1807). The only accompanying text is the letterpress of this engraving: "Timor. Rhinolophe Cruménifère" (*Rhinolophus Crumeniferus* N.) C. A. LESUEUR del. J. MILBERT direx. "CHOUARD sculp. De l'Imprimerie de LANGLOIS". One bat is represented flying, another sitting, seen in front view, and the third sitting, seen in profile. The flying animal and the specimen seen in profile both clearly show the glandula frontalis. Beside the horseshoe of the flying individual, and of the specimen shown in front view, only two lateral leaflets can be counted. The horseshoe has hardly any pigmentation. Both these characters suggest *Hipposideros cervinus* (GOULD, 1854), or a nearly related species (not *H. speoris*).

TATE (1941, p. 359, p. 367 footnote, 382 i.v. *crumeniferus*, 384, i.v. *galeritus*) has suggested that the specific name *crumeniferus* PÉRON, 1807 should displace a specific name of a later date. TATE (l.c. p. 382) had, however, difficulties in determining the number of lateral leaflets in LESUEUR's picture. In the copy of the University Library, Amsterdam, we can count only two lateral leaflets.

The species observed by PÉRON and LESUEUR can hardly be *H. galeritus* (CANTOR) (as TATE has suggested) because CANTOR (1846, p. 184) has emphasized that the male type specimen of this species has no glandula frontalis.

The first volume of PÉRON's narrative was published in 1807, the second in 1816 after his death. The atlas accompanying both volumes bears no date. GEOFFROY (1813, p. 261) emphasized that SCHNEIDER published his *Vespertilio speoris* before PÉRON published his *Rhinolophus*

crumeniferus. From this statement it may be concluded that the atlas was published in any case before 1813.

According to GEOFFROY (l.c.) *Vespertilio speoris* SCHNEIDER from the East Indies is the same species as *Rhinolophus crumeniferus* PÉRON from Timor. The head 'en face' on GEOFFROY's plate 5, however, shows clearly three pairs of lateral leaflets, in accordance with the text where he describes three folds of the epidermis at the sides of the horseshoe. GEOFFROY's text and plate cannot refer, therefore, to LESUEUR's species, observed on Timor, which had only two pairs of lateral leaflets. It is difficult to explain this disagreement. Perhaps LESUEUR observed in the Island of Timor living specimens of a horseshoe bat having a glandula frontalis and two pairs of lateral leaflets (*Hipposideros* cf. *cervinus*), whereas PÉRON collected and brought to the Paris Museum a sample of another species of about the same size having equally a glandula frontalis but three pairs of lateral leaflets (*H.* cf. *speoris*). The question must be left open for a renewed study of the bats from Timor.

Before TATE's paper only BLYTH (1844, p. 489) has denied the identity of *Vespertilio speoris* SCHNEIDER with *Rhinolophus crumeniferus* PÉRON.

§ 4. *Rhinolophus marsupialis* DESMAREST, 1820

DESMAREST (1820, p. 126, species no 187) referred to "*Rhinolophus marsupialis* GEOFFROY. Cours public de 1805" as a synonym of „*Vespertilio speoris* SCHNEIDER, dans l'ouvrage de SCHREBER". Other authors have followed DESMAREST in this respect (GRIFFITH, 1827, synopsis p. 77; J. A. WAGNER in SCHREBER, Suppl. 5, p. 658).

We have already cited (§ 2) GEOFFROY's own testimony that he had spoken, before 1813, in his public lectures, about *Rhinolophus speoris* (SCHNEIDER). GEOFFROY's publication of 1813 does not record, however, either the name *marsupialis* or the date of the lectures.

We have tried in vain to trace a publication of ETIENNE GEOFFROY SAINT-HILAIRE containing his lectures of 1805. The Catalogue of the Library of the British Museum (Natural History) does not refer to it. SHERBORN (Index Animalium) does not mention the name *marsupialis* with regard to a bat. Neither DOBSON, nor TATE, in their synonymy of bats, refer to the name *marsupialis*.

Miss M. G. MADIER, librarian of the Muséum d'Histoire Naturelle, Paris, in her letter to us of June 11, 1956, could only confirm that Geoffroy's lectures of 1805 have not been published, and that only his lectures of 1828 have been printed.

PETERS (1872, p. 321) saw in Paris a specimen labelled „*Rhinolophus marsupialis*, GEOFFROY" from „Pondichery".

To our present knowledge, therefore, the name *Rhinolophus marsupialis* has been published for the first time by DESMAREST (1820), and is invalid, being a younger synonym of *R. speoris* (SCHNEIDER).

§ 5. TYPE LOCALITY AND AREA OF *Hipposideros speoris*

SCHNEIDER's two specimens were said to come from the East Indies. About 1800 this could mean every part of South eastern Asia, from India and Pakistan eastward, including the Malaysian Archipelago, or, in zoogeographical terminology, the whole Oriental region.

GEOFFROY (1813, p. 261) described and figured a specimen from Timor.

TEMMINCK (1835, p. 18) communicated about this species: The two specimens in the Paris Museum are from Timor, two others in the Leiden Museum are from Amboina.

BLYTH (1844, p. 489) recorded the species from India, and denied its identity with the Timor species.

PETERS (1872, p. 320), rather unexpectedly, and without giving any argument, supposes that SCHNEIDER, perhaps, received his specimens from Tranquebar (India), through the intermediation of BLOCH.

JERDON (1874, p. 28), DOBSON (1876, p. 67, and 1878, p. 143), and BLANFORD (1888—1891, p. 288) all have recorded *H. speoris* from India.

KELAART (1852) and PHILLIPS (1935, p. 92) have recorded this species from Ceylon.

Lately TATE (1941, p. 377), with a reference to PETERS (l.c.), has suggested the restriction of the type locality to Tranquebar. We have some doubts whether this suggestion is justified.

§ 6. *Hipposideros larvatus* (HORSFIELD, 1824)

HORSFIELD (1824) has described, from the Island of Java, *Rhinolophus larvatus*, *R. vulgaris* and *R. insignis*. According to TEMMINCK (1835, p. 15) HORSFIELD's *R. vulgaris* is the female of *R. insignis*. In HORSFIELD's

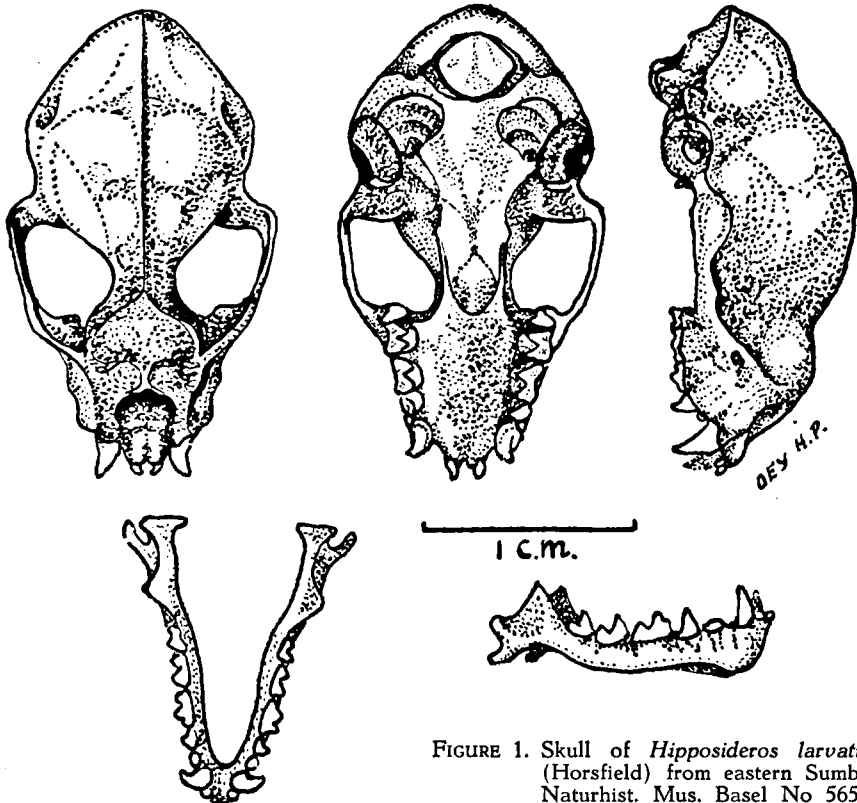


FIGURE 1. Skull of *Hipposideros larvatus* (Horsfield) from eastern Sumba. Naturhist. Mus. Basel No 5651.

description of *R. larvatus* TEMMINCK could not find any important difference from *R. insignis*. Not having seen specimens of *R. larvatus*, TEMMINCK refrained, however, from a definite judgment about *R. larvatus*. We may perhaps sum up TEMMINCK's opinion in this way: he considered *larvatus*, *insignis* and *vulgaris* to be different names for one the same species.

Most later authors, including TATE (1941, p. 377) took the specific name *larvatus* as valid (probably because of page priority in HORSFIELD's paper), and consider *insignis* and *vulgaris* as synonyms of *larvatus*.

After the splitting up of the genus *Rhinolophus* into several genera, the species *larvatus* is included in the genus *Hipposideros* (§ 1).

H. larvatus, including several subspecies, has been recorded from Burma, Siam, Hainan, Sumatra, Java, Borneo, and Bali (see map TATE, 1941, p. 376).

FORCART (1952, p. 182) recorded this species from a locality situated still more eastward: three male specimens from a cave in the eastern part of the Island of Sumba, collected during the expedition Sutter, 1949.

We can now add one specimen from Karoeni, West Sumba (leg. L. P. KRIJGER, Aug.-Sept. 1932; Zoölogisch Museum, Amsterdam, No 1536; measurements in table).

§ 7. THE *speoris* GROUP OR SUBGENUS *Hipposideros* (*Hipposideros*) TATE, 1941

We have concluded that the names *Hipposideros speoris* (SCHNEIDER) (§ 2), type locality Oriental region (§ 5), and *H. larvatus* (HORSFIELD), type locality Java (§ 6) are valid.

TEMMINCK (1835) has pointed out that *H. speoris* and *H. larvatus* (synonym *H. insignis*) though of different size, and considered to be specifically distinct, show much anatomical resemblance in the dentition, the nasal apparatus, the form of the skull, and the glandula frontalis. Also BLYTH (1844), PETERS (1872, p. 320), and DOBSON (1876, p. 67 sq.) have arranged these two species next to one another. TATE (1941, p. 377 sq.) united these two Oriental species with *H. abae* (J. A. ALLEN, 1917) from Central Africa into the *speoris*-group or subgenus *Hipposideros* (*Hipposideros*). The African species will not occupy us here (cf. AELLEN, 1952).

The specific differences between the species *H. speoris* and *H. larvatus* concern a. the glandula frontalis, vulgo frontal sac (§ 8), b. the front edge of the horseshoe (§ 9), c. the free tip of the tail (§ 10), and d. the body size (§ 11).

§ 8. GLANDULA FRONTALIS

H. speoris

A. Published diagnoses

A blind sac in the middle of the front, behind the nasal leaf. The aperture is marked by a thickened rim and can be closed and opened by a sphincter. It looks like the closed eye of a Cyclops. (GEOFFROY, 1813, p. 262)

H. larvatus

A. Published diagnoses

The ♂ has, behind the nasal leaf, a large tube or sac, and on both sides of this sac a little, hardly visible hole. From these openings arise three tufts of hairs. (TEMMINCK, 1835, p. 14)

A frontal glandular sac (distinct in ♂, rudimentary in ♀) behind the terminal erect nose-leaf.
(DOBSON, 1876, p. 60)

In the development of the frontal sac this species corresponds very closely with *H. larvatus*, and may, on superficial examination, be confounded with it, especially when adult ♀ is compared with young ♂ or ♀.
(DOBSON, l.c., p. 67)

Frontal sac distinct in ♂.
(DOBSON, 1878, p. 129, synopsis)

Frontal sac well developed.
(BLANFORD, 1888—'91, p. 288)

Frontal sac well developed in (old) ♂, rudimentary in ♀.
(PHILLIPS, 1935, p. 92)

Frontal sac large in ♂, obsolescent in ♀, but invariably marked by a tuft of dark brown hairs.
(TATE, 1941, p. 378)

B. Observations of the present authors

Glandula frontalis present in ♂ (in one case, Basel No 177, only a tuft of dark hair). Represented in ♀ by a tuft of stiff, dark hair.

As in *H. speoris* (DOBSON, l.c.)

Frontal sac greatly developed in adult ♂, with swollen raised edges and an oblique transverse opening. In ♀ rudimentary, its place in dried skins being indicated only by a pencil of dark hairs.
(DOBSON, l.c. p. 68)

Frontal sac distinct in ♂.
(DOBSON, 1878, p. 129, synopsis)

A well-marked frontal sac in ♂, but much smaller in ♀.
(BLANFORD, l.c., p. 288)

Frontal sac present in both sexes.
(TATE, l.c. p. 378)

B. Observations of the present authors

Glandula frontalis in ♂ rather deep, with swollen margins (the lower margin is especially thick), with a few straight, dark hairs, or without any hair. In ♀ very shallow, almost negligible, without swollen margins (a very small lower lip in specimen Amsterdam No 1654), showing a tuft of dark brown hair rooted in the bottom of the sac. These hairs are darker than the surrounding pelage of the face, and not so straight as in ♂.

The late Dr TATE has informed us (in litt.) that he had never seen such a shallow sac with hairs in this species, and suggested that the development of the frontal sac may differ greatly according to the age of the individual

Conclusion. In both species the frontal gland is well developed in ♂. In ♀ it is represented, as a rule, by a tuft of hair. This organ cannot be used for the distinction of species in this subgenus.

§ 9. THE FRONT EDGE OF THE HORSESHOE

H. speoris

A. Published diagnoses

No incision in the front free edge of the horseshoe (DOBSON, 1876, p. 67)
(DOBSON, 1878, p. 144, jo 145, the same diagnosis)

Anterior leaf notched in front (PHILLIPS, 1935, p. 92). The accompanying fig. 15, called by TATE (1941, p. 378) "an excellent illustration", shows clearly this notch.

The horseshoe shows only the faintest trace of emargination of the centre of its front edge (wholly unlike the deep notch observable in *larvatus*),
(TATE, 1941, p. 378)

B. Observations of the present authors

We could not find a notch in 13 specimens from Ceylon. We cannot explain the remark and illustration of PHILLIPS.

H. larvatus

A. Published diagnoses

Front free edge of the horseshoe with a narrow emargination in the middle line, equalling in depth about one third of the width of the horizontal nose-leaf. (DOBSON, l.c., p. 68). Notch indistinguishable in the accompanying woodcut.
(DOBSON, 1878, p. 145, the same diagnosis)

Small, but clearly defined median cleft in the anterior margin of the horseshoe. (TATE, 1941, p. 378)

B. Observations of the present authors

We have found an unmistakable, but very narrow cleft in ♂ specimens from Sumatra and Sumba, less deep or even lacking in ♀. The margins of the cleft are sometimes overlapping, and are, therefore, not easily represented in a drawing.

§ 10. FREE TIP OF THE TAIL AND FORM OF THE UROPATAGIUM

H. speoris

A. Published diagnoses

The last caudal vertebra completely free from the interfemoral

H. larvatus

A. Published diagnoses

Interfemoral membrane triangular behind. Extreme tip of tail

membrane. (DOBSON, 1876, p. 68)
Last osseous caudal vertebra projecting abruptly (DOBSON, 1878, p. 130, synopsis)

Interfemoral short, square behind. The last osseous caudal vertebra and half the ante-penultimate vertebra free.

(DOBSON, l.c. p. 144)

Interfemoral membrane narrow, square, enclosing the tail, the half of the last joint alone free (JERDON), 1874, p. 28)

Hinder margin of interfemoral membrane straight. (BLANFORD, 1888—'91, p. 282, synopsis)

Interfemoral membrane short, square behind. The end of the tail projecting.

(BLANFORD, l.c. p. 288)

Tail rather short, enclosed in the interfemoral membrane, except for the tip, about 4 mm of which projects from the outer margin. Outer margin of the interfemoral membrane concave.

(PHILLIPS, 1935, p. 92)

The terminal point of the tail half extruded from uropatagium (TATE, 1941, p. 378)

B. Observations of the present authors

In 13 specimens from Ceylon the tip of the tail is free for 3 mm or less.

free. (DOBSON, l.c. p. 68)

Tail almost wholly contained within the wing-membrane (DOBSON, 1878, p. 130, synopsis)

Interfemoral membrane triangular behind. Extreme tip of tail free. (DOBSON, l.c., p. 145)

Hinder margin of interfemoral membrane forming a salient angle. (BLANFORD, l.c., p. 282, synopsis)

Interfemoral membrane projecting and triangular behind. Extreme tip of tail free.

(BLANFORD, l.c., p. 288)

B. Observations of the present authors

In the specimens from Sumatra and Sumba a free tip of the tail is hardly recognizable, or only for a length of 1 m or less. In one exceptional case (Genève 874/22) the right side of the uropatagium leaves free a few mm of the tail, which is connected at the left side.

§ 11. THE BODY SIZE

According to most authors *H. larvatus* has a larger body size than *H. speoris*. The length of the forearm shows this difference clearly (see tables of measurements and diagram Fig. 2). The measurements of 12 specimens of *H. speoris* from Ceylon are nearly continuous with those of 63 specimens of *H. larvatus* from Java.

The few Sumba specimens lie within the range of variability of the Java specimens.

The figures from Sumatra overlap those from Java for a great part, but partly have higher values.

Borneo has yielded markedly larger specimens, described by Sody (1936, p. 46 sq.) as *H. larvatus neglectus*.

The fact that the specimens from the lesser islands Nias and Sumba show much less variability than those from the larger islands of Sumatra, Java, and Borneo, could be ascribed to the small number of measured specimens.

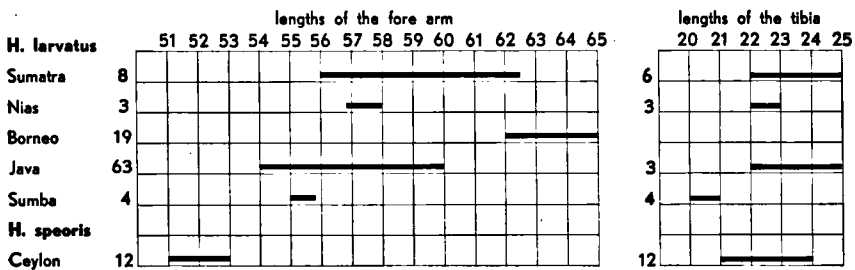


FIGURE 2. Measurements of the two species in discussion.

For the length of the tibia fewer measurements are available than for the forearm. What is known seems to indicate that the tibia varies independently of the forearm. This is, perhaps, understandable in natural selection. A minute change in the length and surface of the patagium (cf. also § 10) perhaps, has more influence on the chance of survival than a change in the length of the posterior extremity.

§ 12. CONCLUSION.

According to our observations it is possible to distinguish *H. speoris* and *H. larvatus* in this way.

H. speoris (SCHNEIDER)
 Front edge of horseshoe entire.
 Tip of tail free from uropatagium for about 3 mm.
 Length of forearm 53 mm or less.

H. larvatus (HORSFIELD)
 Front edge of horseshoe interrupted by a narrow notch.
 Tip of tail nearly wholly included in uropatagium, free only for 1 mm or less.
 Length of forearm 54 mm or more.

We have found no other differences between the two species. Obviously the given boundary of the length of the forearm cannot be definitive as we had only too few measurements at our disposition.

According to this table our three specimens from Nias and our only specimen from Sumba belong to *H. larvatus*.

For a better understanding of the observed characters a study of more specimens of both species, from several localities, and of other species of horseshoe bats from the Oriental and adjacent regions is necessary.

TABLE 1. *Hipposideros larvatus* (HORSFIELD). Measurements of skull (1—7) and ear (8) in mm, 1. Maximum length (occipitale — base of incisivi), 2. Zygomatic width, 3. Mastoid width, 4. Width of nasal swellings, 5. Mandible length (processus condyloideus — base of incisivi), 6. Upper teethrow, 7. Lower teethrow, 8. Length of ear (Base of ear at the inside — top).

Specimens in Rijksmuseum van Natuurlijke Historie, Leiden are from the collection H. J. V. Sody.

Museum	No.	Locality	Sex.	1 le	2 z.w.	3 m.w.	4 n.w.	5 mnd.	6 u.t.	7 l.t.	8 ear
Basel	5649	E. Sumba	m	22.0	12.6	10.9	6.5	—	9.1	9.6	19
"	5651	" "	m	21.8	12.1	10.8	6.4	15.0	9.3	9.5	21
Amsterdam	1536	W. Sumba		21.2	12.0	10.5	6.1	—	9.3	9.4	20
Leiden	438	Java		23.0	13.1	11.0	6.9	15.9	9.0	10.1	20
"	Pang 31	"	—	23.2	12.6	11.0	6.8	15.6	10.0	10.3	—
"	Sq 76	"	—	23.5	12.6	11.0	6.9	15.3	9.5	10.3	—
Amsterdam	1655	Nias	m	23.0	12.8	11.1	6.8	—	10.0	10.4	20
"	1655	"	f	23.0	12.9	11.2	7.0	—	9.8	10.6	18
"	1654	Deli (Sumatra)	—	23.2	13.0	11.2	6.9	—	10.3	10.9	21

TABLE 2. *Hipposideros larvatus* (HORSFIELD). Length of forearm and of tibia in mm. Specimens in Museum Leiden are dried skins from collection H. J. V. Sody. All other specimens are preserved in alcohol.

Museum	No.	Locality	Sex.	Forearm	Tibia	Measured by
Basel	5649	E. Sumba	m	55.0	20	Forcart & Oey
"	5650	" "	m	55.1	21	" " "
"	5651	" "	m	55.7	20.5	" " "
Amsterdam	1536	W. "	f	55.5	20	Oey
Leiden	438	Java	f	55.0	24	"
"	Pang 31	"	—	58	23	"
"	Sq. 76	"	—	59	22	"
Basel	3568	Nias	f	58.4	22.5	"
Amsterdam	1655	"	m	59.0	23	"
"	1655	"	f	57.8	22	"
"	1654	Deli (Sumatra)	f	58.0	23	"
Genève	874/22	Sumatra	f	56	22	van der Feen
"	"	"	m	60.5	25	" " "
"	"	"	f?	61	24.5	" " "
"	"	"	m	58	23	" " "
"	"	"	f	58	25	" " "

TABLE 3. *Hipposideros speoris* (SCHNEIDER). Length of forearm and of tibia in mm. All specimens preserved in alcohol.

Museum	No.	Locality	Sex.	Forearm	Tibia	Measured by
Genève	874/46	Ceylon	m	51	22	van der Feen
"	"	"	f	51	22	" " "
"	"	"	f	51	22	" " "
"	"	"	f	51	22	" " "
"	"	"	f	52	23	" " "
Basel	177	"	m	53	21	" " "
"	178	"	m	53	23.5	" " "
"	180	"	m	53	24	" " "
"	181	"	f	53	22	" " "
"	183	"	f	52	22.5	" " "
"	184	"	f	51	21.5	" " "
"	185	"	f	53	22	" " "

TABLE 4. *Hipposideros larvatus* (HORSFIELD). Length of forearm, in mm, according to SODY, 1936, p. 47, measured by SODY and others.

Locality	number of specimens	forearm
W. Java	29	56—60
W. Java	34	55—59
Java		54—56
S. Sumatra	2	61 and 62.5
C. Borneo	13	62—63
Borneo	6	62—65
Karimata Island	1	54.8

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